



# **Modular powerchair control system**

dynamic™ 

**DX PRODUCT SELECTION GUIDE**



# 1 Introduction to the DX System

The DX-system is a modular powerchair control system. This modularity makes it possible to design a powerchair that can meet the requirements of any user - requirements that can range from simple drive-only control to full environmental control. Just add additional modules when requirements grow.

## *The heart of the DX System*

The most basic DX control system consists of two parts:



A DX Power Module, connects to the battery and to the motors



A DX Master Remote

The Master Remote is the brain of the DX System. Every DX System must have one, and only one. There are several different Master Remotes available to choose from: with joystick, without joystick, chin remote, attendant remote, etc.

## *DX System extensions*

In addition to the Power Module and the Master Remote, many other remotes and modules are available to extend the DX System, like:

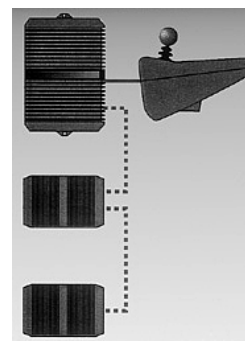
- Secondary Remotes, for example: attendant remotes, sip 'n puff, finger steering
- Switch input modules
- Lighting and Seating control modules
- Environmental control modules

The DX System can be extended to a maximum of 16 modules.

## *DX System connections*

All modules are connected to each other by a DX BUS cable. Most DX Modules have two DX BUS connector sockets. That way you can connect another DX part easily.

DX BUS is an interface (the way the modules "talk" to each other) based on the CAN interface, which is widely used in the automotive industry. CAN is well known for its reliability and its fault detection. DX BUS inherits this reliability, and even improves on it.



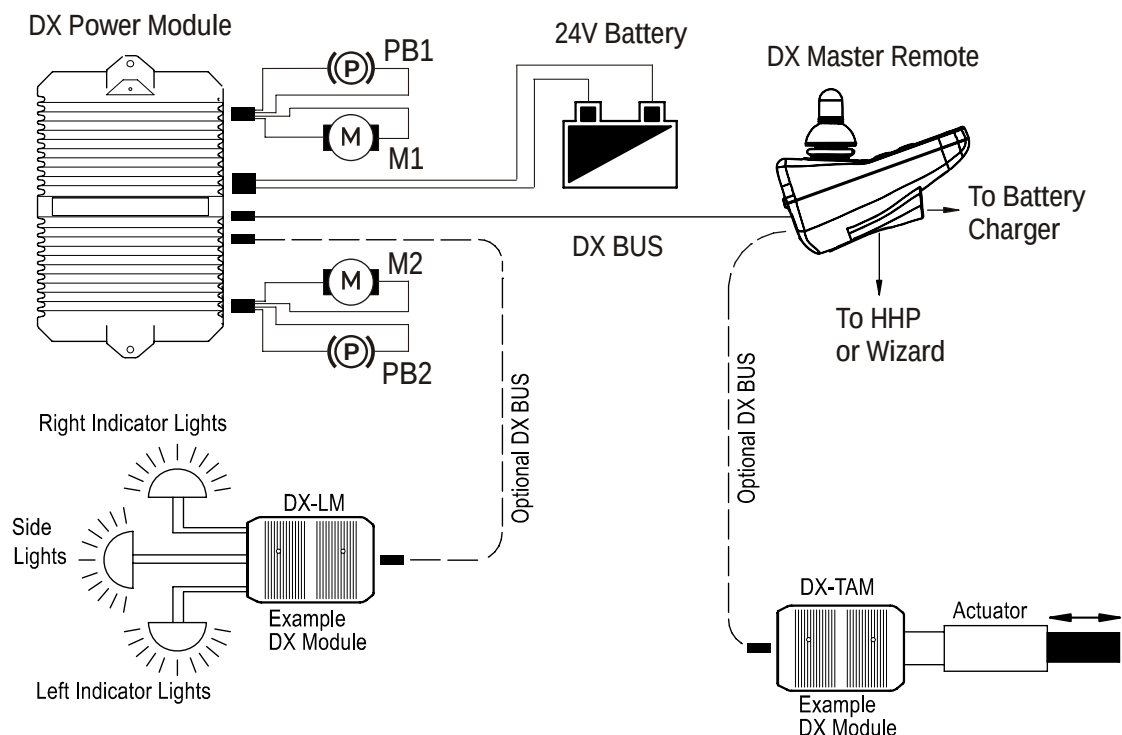
## *One system fits all*

Start out with a simple system and add the modules you need at the time they become available, or when the application requirements grow.

## 2 A typical DX powerchair setup

A standard powerchair installation with the DX System consists of the following electrical parts:

|                                                                                   |                                        |
|-----------------------------------------------------------------------------------|----------------------------------------|
|  | The Batteries                          |
|  | The Motors                             |
|  | The Parkbrakes                         |
|  | A DX Power Module                      |
|  | A DX Master Remote                     |
|  | The DX BUS cables                      |
|  | Optional: Actuator or Lighting Modules |

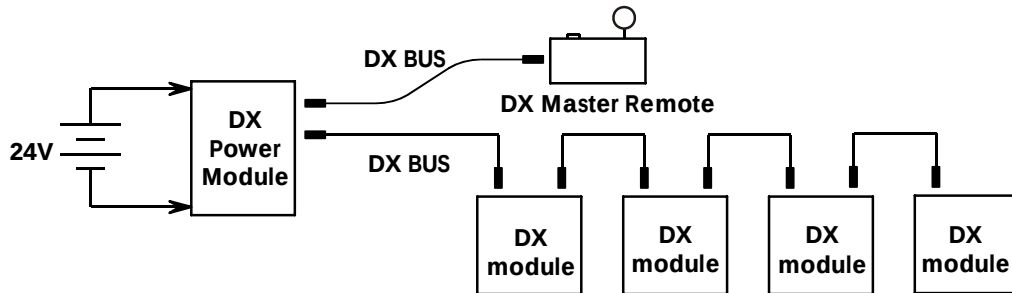


Do not install, maintain, or operate this equipment before you have read and understood the installation manuals for the product. Follow the instructions of the manuals, otherwise injury or damage can result.

## 2.1 DX BUS Module connection layout

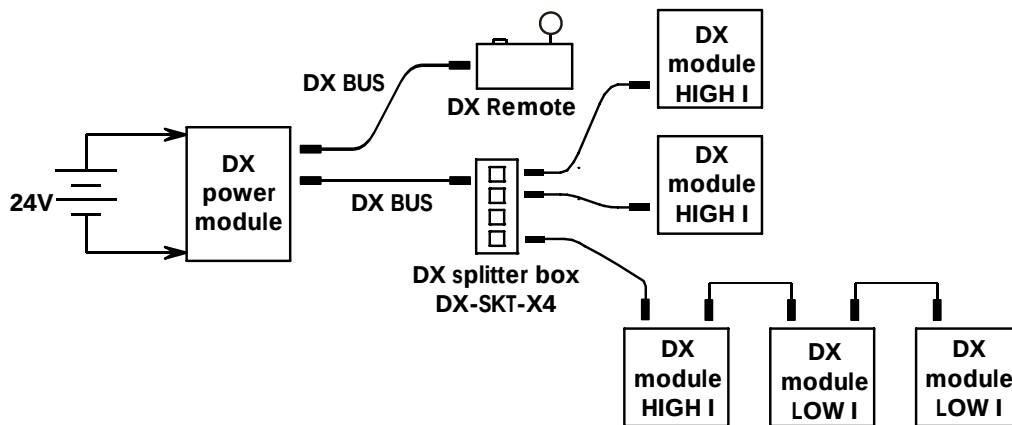
DX Modules normally have one or two DX BUS sockets for system interconnections. Smaller DX Modules can have a fixed cable that ends in a DX BUS plug, instead of DX sockets.

The optimum connection layout is dependent on the type of modules that are present in the DX System. Low-current modules can be connected in series. This provides a low-cost and simple solution.



**DX modules connected in series**

Because of the internal resistance of the DX BUS cable, high-current modules can cause a voltage drop on the DX BUS when they are connected far away from the Power Module. For this reason all high-current DX Modules (for example actuators and lights) must be connected as close to the Power Module as possible, preferably in parallel.



**High-current DX modules connected in parallel**



**Note:**

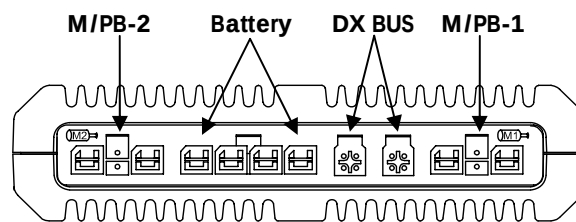
*The total length of all DX BUS cables together must not exceed 15 m.*

### 3 The DX Power Module

The DX Power Module converts the speed and direction signals generated by a DX Remote into high current outputs. These outputs drive the motors and activate the parkbrakes.

The Power Module must be connected to:

- The DX BUS
- The battery
- The motors
- The parkbrakes



The Power Module is fully programmable for a wide range of powerchair types and user needs.

#### 3.1 Available Power Modules

| Power Module                                                                                     | Current                       | Motor type |
|--------------------------------------------------------------------------------------------------|-------------------------------|------------|
| <br>DX-PMB    | 60A dual                      | 24V DC     |
| <br>DX-PMB2   | 80A dual                      | 24V DC     |
| <br>DX-PMB-S  | 120A single (2x 60A parallel) | 24V DC     |
| <br>DX-PMB2-S | 160A single (2x 80A parallel) | 24V DC     |

The PMB-S has its two motor and Park Brake channels driven in parallel, for a single motor output with twice the current of each channel of a standard Power Module. The PMB-S is used in DX Systems with only one drive motor, such as servo steered powerchair systems.

## 4 The DX Master Remote

### 4.1 Introduction

The Master Remote is the central building block in a DX System. Every DX System must have one, and only one Master Remote.

The DX Master Remote

- Acts as the primary user interface
  - Has the system on/off switch
  - Reads user commands (joystick movement, button pushes, switches)
  - Displays the system status to the user via the System Status LED
- Controls the status of the DX System
- Stores and controls up to six Drive Profiles.
- Provides a DX System programming socket for the HHP or the Wizard.

The Master Remote is fully programmable to suit a wide range of powerchair types and user needs. Correct installation and programming are essential to ensure optimum performance and safety.



**The G90 Master Remote**

Most Master Remotes have their own user input device in the form of a joystick, but this is not always the case. For example: the G91 does not have a joystick, it depends on either a Secondary Remote or a set of switches to obtain direction and speed commands.

Most Master Remotes have their own display with battery gauge and system status information. Some Master Remotes however, such as the chin remote and the tray remote, do not have their own display, they only have a System Status LED.

## 4.2 Available Master Remotes

### 4.2.1 Master Remotes with joystick

| Master Remote                                                                                                                     | Application                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br>DX-REMG90A<br>DX-REMG90T                     | Advanced driving<br>Advanced seating<br>Highly customisable<br>Switched control available<br>Joystick only menu control available<br>Environmental control<br>G90A: two sockets to connect external switches<br>G90T : two toggle switches |
| <br>DX-REM34<br>Dolphin Remote                   | Advanced Driving<br>Seating and lighting<br>All actuators directly accessible from keypad                                                                                                                                                  |
| <br>DX-REM41<br>DX-REM41S<br>Dolphin Tray Remote | Advanced Driving<br>Seating and lighting<br>All actuators directly accessible from keypad                                                                                                                                                  |
| <br>DX-REM32<br>Chin Remote                    | Chin control<br>Drive only: Joystick, on/off switch, Speedpot<br>No display<br>No battery charger socket, only a programming socket                                                                                                        |
| <br>DX-REM35<br>Tray Remote                    | Drive only: Joystick, on/off switch, Speedpot<br>No display<br>No battery charger socket, only a programming socket                                                                                                                        |
| <br>DX-ACU3<br>Attendant Control Unit          | Master Remote joystick for attendant use.<br>Switch to take control / release control<br>Can control chair, charging and actuators.<br>Optionally use Secondary Remote for user control.                                                   |

## 4.2.2 Master Remotes without joystick

| Master Remote                                                                                                             | Application                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p>DX-REMG91<br/>DX-REMG91S</p>         | <p>Can be mounted close to the face of the user to optimise visibility<br/>Advanced driving, seating, lighting and environmental control<br/>3-quadrant RIM, switched or proportional<br/>Optional joystick control with Secondary Remote<br/>Bi-directional actuator control<br/>Highly customisable<br/>Accessory Shortcut Key gives access to the last used function<br/>G91S provides single switch scanning</p> |
|  <p>DX-MASTERSW<br/>Switch Interface</p> | <p>Switched Drive (4 directions) + one switched On/Off control<br/>Optional joystick/attendant control with Secondary Remote</p>                                                                                                                                                                                                                                                                                     |
|  <p>DX-SCR<br/>Specialty Controls</p>    | <p>Advanced menu-driven driving and environmental control<br/>Joystick operation through Secondary Remote<br/>Joystick-only control option<br/>Joystick + Mode button control<br/>Single Switch Scanning control</p>                                                                                                                                                                                                 |

## 5 DX Modules

### 5.1 Introduction

Including the Power Module and the Master Remote, a DX System can contain up to 16 DX compatible modules depending on the application.

Available types of DX Modules are

- Remote Joystick Module (RJM),
  - DX-RJM Secondary Remotes
  - Switch modules
- Attendant Control Unit (ACU), joystick with attendant switch and Speed Pot
  - DX-ACU1
- Actuator Remote Control (ARC), 5 channels of extend/retract switches
  - DX-ARC / DX-ARC-SWB
- Servo Steering Motor Modules
  - DX-SLM, for steering servo motor control + lights
- Lighting Modules
  - DX-SLM/ DX-LM/ DX-CLAM
- Actuator Modules
  - DX-CLAM/ DX-TAM
- Environmental Control Unit Modules (ECU)
  - DX-ECU



The DX System has the option to declare some DX Modules as safety critical. This makes sure that the DX System will not operate when that particular module is not detected during power-up.



**Warning:**

*Each DX Module has its own Installation Manual that describes the installation requirements of that particular module. If you have purchased a specific DX Module, read and understand the installation manual of that module before installing or using the module.*

## 5.2 Secondary Remotes

A Secondary Remote is a secondary user input device, for example an attendant joystick.

A Secondary Remote...

- Converts user input (the joystick or the switches, depending on the type of Secondary Remote) to speed and direction signals
- Sends the speed and direction signals to the Master Remote via the DX BUS
- Can control non-driving functions (for example actuators or environmental controls), if the Master Remote in use supports joystick control of these functions.

To use a Secondary Remote, select it as the **Joystick Source** in one of the Drive Profiles.

Only one RJM-type Secondary Remote can be present in a DX System at the same time.

### 5.2.1 Available Secondary Remotes

| Secondary Remote                                                                                                                        | Applications                                                                                                                                                                                                          |
|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p>DX-RJM<br/>Remote Joystick<br/>Module</p>         | <p>Attendant joystick<br/>User joystick for Master Remotes without joystick<br/>User joystick mountable on the armrest or away from it<br/>Compact chin remote</p>                                                    |
|  <p>DX-RJM-HD<br/>Heavy Duty Joystick</p>            | <p>Users without finer hand movement<br/>Situations where a normal joystick can be damaged</p>                                                                                                                        |
|  <p>DX-RJM-MINI<br/>DX Mini Joystick</p>             | <p>Full proportional control with very little movement or force<br/>Completely sealed - can be used as a tongue joystick</p>                                                                                          |
|  <p>DX-ACU1<br/>Dual Control</p>                     | <p>Attendant joystick<br/>Attendant can take drive control with Attendant/User switch<br/>Attendant can adjust chair speed<br/>ACU-type Secondary Remote - can be used together with an RJM-type Secondary Remote</p> |
|  <p>DX-RJM-VIC-CCD<br/>Finger Steering Control</p>   | <p>Zero force optical operation<br/>Users with very little strength in their hand/fingers<br/>Full proportional control<br/>Finger movement of 2 mm per direction is enough</p>                                       |
|  <p>DX-ACC4 (RJM-type)<br/>Four Switch Interface</p> | <p>Driven by four momentary switches,<br/>Either separate switches or<br/>Switches combined in one unit (for example the wafer switch)<br/>Provides up to eight driving directions</p>                                |

| Secondary Remote                                                                                                              | Applications                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br>DX-5SW (RJM-type)<br>5 Switch Module     | Five switch inputs plus extra 'Emergency Stop' input<br>Accepts input devices terminated in a '9-pin D' connector<br>Analog Latch mode gives infinitely adjustable cruise speed<br>3 momentary modes, 4 latched modes |
| <br>DX-SNP (RJM-type)<br>Sip and Puff Module | Recognises soft and hard sips and puffs<br>Sip and puff pressures programmable<br>Analog Latch mode gives infinitely adjustable cruise speed<br>3 momentary modes, 4 latched modes                                    |

### 5.3 DX Steering/Actuator/Lighting Modules

| DX Module                                                                                                                               | Function / Applications                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br>DX-SLM<br>Servo Lighting Module                    | Drives a separate motor for steering castor wheels<br>Commonly used for high speed outdoor powerchairs<br>24V, 30A peak, 5A continuous Servo steering<br>24V lighting                                                                                                                                                                                                                              |
| <br>DX-CLAMB<br>Combined Lighting and Actuator Module | Compact module to connect all common functions: <ul style="list-style-type: none"> <li>• Five actuators</li> <li>• Front lights, Rear lights</li> <li>• Left and right turning indicators, Hazard lights</li> </ul> All power and control signals provided through the DX BUS<br>Soft Start feature provides smooth actuator control<br>Slow/Stop input (for actuator position switches)           |
| <br>DX-LM-Z<br>Lighting Module                       | 24V lighting (DX-LM-Z) <ul style="list-style-type: none"> <li>• Front lights, Rear lights</li> <li>• Left and right turning indicators, Hazard lights</li> </ul> Short-circuit and open-circuit detection                                                                                                                                                                                          |
| <br>DX-TAM<br>Two Actuator Module                    | Simple and compact solution for two actuator control<br>All power and control signals provided through the DX BUS<br>Soft Start feature provides smooth actuator control<br>Slow/Stop input (for actuator position switches)<br>Programmable current limits and maximum operation time                                                                                                             |
| <br>DX-ARC5<br>Actuator Remote Control               | Separate handset for actuator control<br>Ideal for <ul style="list-style-type: none"> <li>• attendant use</li> <li>• users who have difficulty with the controls of the Master Remote</li> </ul> Controls up to 5 seat positioning actuators<br>Actuators can optionally be operated while driving<br>Can be programmed to control horn, lights and driving<br>Needs DX-CLAMB or DX-TAM to operate |
| <br>DX-ARC-SWB<br>ARC Switchbox                      | Controls up to 5 seat positioning actuators<br>Can be programmed to control horn, lights and driving<br>Operates with external switches (DB15 connector)<br>Choose switch combinations and mounting positions freely<br>One extra 24V/1A power supply output                                                                                                                                       |

## 5.4 DX Environmental Control Modules

| DX Module                                                                                                                 | Function / Applications                                                                                                                                                                                                                                                                                                          |
|---------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br>DX-ECU<br>Environmental Control Unit | Needs the DX-SCR, the G90 or the G91 Remotes to operate<br>Uses the Secondary driving Remote as input control<br>'8 Output mode' controls up to eight separate devices<br>'Mouse mode' acts as a mouse mover, fifth switch acts as click<br>Up to two DX-ECU modules in one DX System<br>All outputs are isolated relay contacts |
| <br>DX-IRIS2<br>Infra-Red Transmitter    | Learning infra-red remote control<br>360° transmission<br>Supports GEWA devices<br>Works together with the Specialty Controls Master Remote                                                                                                                                                                                      |
| <br>DX-PCMR<br>Infra-Red Mouse Receiver  | Receives mouse commands from the DX-IRIS2<br>Works alongside the computer's existing mouse<br>Serial port connection<br>USB-Serial converter: DX-USB-COM                                                                                                                                                                         |

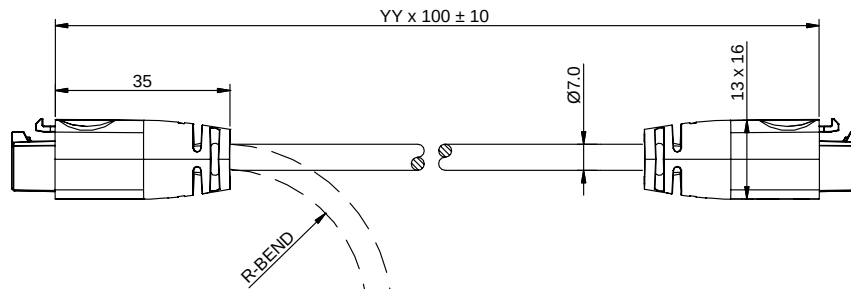
## 5.5 DX Auxiliary Modules

| DX Module                                                                                                               | Function / Applications                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br>DX-ACC2<br>Drive Stop Module     | Powerchair lock<br>Makes sure that only authorised people can drive the chair<br>Lighting and actuator functions are still operational when the powerchair is locked                                             |
| <br>DX-ACC3<br>Charger Socket Module | Small charger socket, can be mounted in a convenient location<br>Use with remotes that do not have a charger socket<br>Use as an alternative to the Master Remote charger socket<br>Maximum 8 A charging current |

## 6 The DX BUS cable

### Cable specifications – straight cable

| DX BUS cable straight                         |        |                   |
|-----------------------------------------------|--------|-------------------|
| Length                                        |        | Part/Order number |
| 300 mm                                        | 1 ft   | GSM63003          |
| 500 mm                                        | 1' 8"  | GSM63005          |
| 1.0 m                                         | 3' 3"  | GSM63010          |
| 1.5 m                                         | 4' 11" | GSM63015          |
| 2.0 m                                         | 6' 7"  | GSM63020          |
| 2.5 m                                         | 8' 2"  | GSM63025          |
| DX BUS cable with Ferrite bead to improve EMC |        |                   |
| 2.0 m                                         | 6' 7"  | GSM63020F         |
| DX BUS extension cable (male + female plug)   |        |                   |
| 300 mm                                        | 1 ft   | GSM65433          |
| 1.0 m                                         | 3' 3"  | GSM63081          |



The part number of the straight cable is GSM630YY, where YY = the length in 100 mm.

| Parameter                                           | Value                                  |
|-----------------------------------------------------|----------------------------------------|
| Connector Latch Holding Force                       | 40 N min                               |
| Cable Strain                                        | 100 N max (accidental, non-repetitive) |
| Cable Flex Force                                    | 10 N max                               |
| Minimum Cable Bend Radius                           | 10 mm / 0.39 inch - fixed installation |
| Flexing values for (T > -10°C/14°F)                 | 25 mm / 1 inch - occasional flexing    |
|                                                     | 50 mm / 2 inch - frequent flexing      |
| Operating Temperature (ambient, fixed installation) | -25°C to +50°C<br>-13°F to +122°F      |
| Cable Temperature Rating                            | 80°C / 176°F (internal operating temp) |

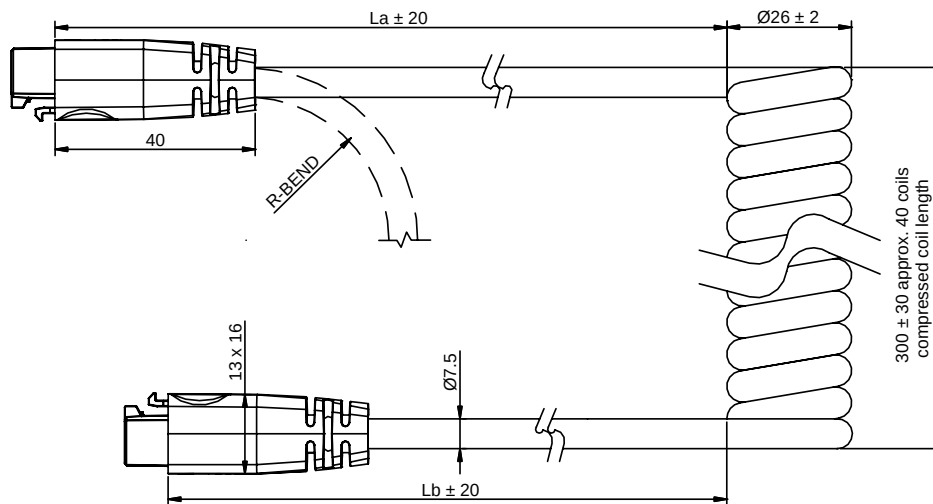


#### Warnings:

1. The specified bend/flex radiuses are minimum values and must be considered as a guideline only. Where frequent flexing is part of the intended application, the installer must ensure an appropriate bend/flex radius for the intended and foreseeable environmental conditions.
2. Extreme cold temperatures considerably reduce cable flexibility. Appropriate life testing must be carried out to determine/confirm the expected service life and inspection and maintenance schedule.

### Cable specifications – curly cable

| DX BUS Curly Cable |               |                 |                   |
|--------------------|---------------|-----------------|-------------------|
| Tail Length La     | Coil Length   | Tail Length Lb  | Part/Order number |
| 200 mm / 8 inch    | 300 mm / 1 ft | 200 mm / 8 inch | GSM63051          |
| 500 mm / 1'8"      | 300 mm / 1 ft | 200 mm / 8 inch | GSM63052          |



| Parameter                                                        | Value                                                                                                                 |
|------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Connector Latch Holding Force                                    | 40 N min                                                                                                              |
| Cable Strain                                                     | 100 N max (accidental, non-repetitive)                                                                                |
| Spring Force -<br>extension refers to the coiled section         | < 20N @ 2x extension (T > 10°C/50°F)<br>< 50N @ 2x extension (T > -10°C/14°F)<br>< 30N @ 3x extension (T > 10°C/50°F) |
| Minimum Cable Bend Radius<br>Flexing values for (T > -10°C/14°F) | 20 mm / 0.8 inch - fixed installation<br>30 mm / 1.2 inch - occasional flexing<br>50 mm / 2 inch - frequent flexing   |
| Operating Temperature<br>(ambient, fixed installation)           | -25°C to +50°C<br>-13°F to +122°F                                                                                     |
| Cable Temperature Rating                                         | 80°C / 176°F (internal operating temp)                                                                                |



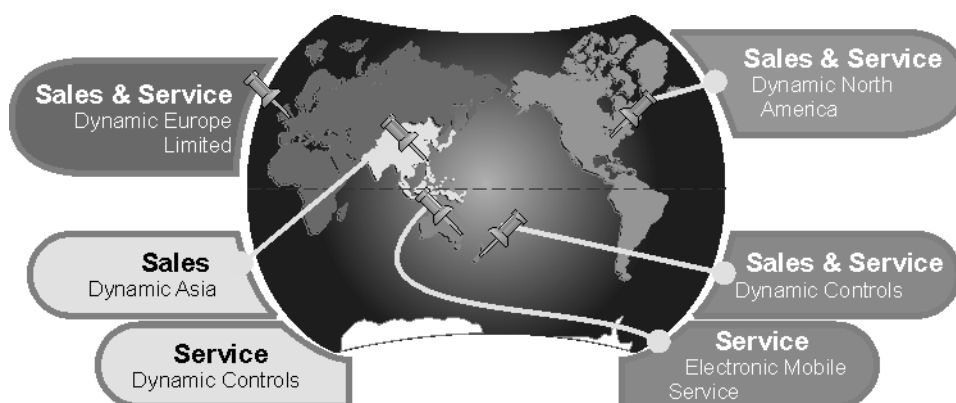
#### Warnings:

1. Do not extend the coils when the temperature is below 0°C/32°F. Do not extend the coils farther than 2x compressed length when the temperature is below 10°C/50°F. Avoid extension above 3x compressed length at all times. This may result in permanent stretching of the coils.
2. Make sure that the spring force is not applied to the DX BUS connector. Fasten a strain relief or cable tie on or near to the coiled section of the cable.

## Contact Details

Dynamic has a global network of sales and service centres. Please contact your nearest Dynamic representative for Sales and/or Service advice, or visit our web site:

[www.dynamiccontrols.com](http://www.dynamiccontrols.com)



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